Letter from Alexander Graham Bell to Mabel Hubbard Bell, January 9, 1892, with transcript

ALEXANDER GRAHAM BELL TO MABEL (Hubbard) BELL Beinn Bhreagh, C. B. Sat. Jan. 9th, 1892. JOURNAL Mrs. A. Graham Bell, c/o Maquay Hooker and Co., Florence, Italy. Dear Mabel:

Tried flying machine today with bigger fire — in presence of Mr. Martin, Mr. Ellis, Mr. McCurdy, Susie, George, and Douglas. All watched at a respectful distance — but the thing wouldn't burst when we wanted it to. Simply the solder gave way in one or two places at the same time — and steam escaped with only force enough to knock it off the fire. The thing didn't fly! We carried it back to the laboratory and hung it up in the museum as a model.

Although its numerous attempts to fly have been attended with only indifferent success — on account of leaky boiler. — I have the feeling that this machine may possibly be the father of a long line of vigorous descendants! — that will plough the air from Beinn Bhreagh to Washington! — and perhaps revolutionize the world! Who can tell? Think of the telephone! Anyhow I have a feeling of respect for the machine that has refused to commit suicide — though repeatedly urged to do so — so I have treated him tenderly and treated him with care — and given him a prominent place in the laboratory museum. I look upon him as an ancestor already!

Convinced that we have made an important step in brushing the surface of an ozokerite record — while it is in the midst of a mass of liquid plaster. The moulds we have made in this way — beautiful — and free from holes. A rabbit's toe makes a beautiful 2 soft brush. Yesterday we made some ozokerite cylinders — of a tapering kind — one end smaller diameter than the other — from brass cylinders life size — not the little baby one — on two of these cylinders I made a record — and Mr. Ellis took plaster moulds from them in

the new way. Ozokerite cylinder — closed at bottom with brass plug — was pressed into mass of liquid plaster. Level of liquid rose till plaster reached almost up to top of ozokerite cylinder.

A rabbit's toe, from which the nail had been drawn — was used as a brush. It was tied to end of a stick — and introduced into midst of liquid plaster — Whole surface of ozokerite cylinder was carefully and softly brushed.

Rabbit's toe was then withdrawn and plaster left undisturbed — to set.

Two moulds made in same way. Both moulds were quite loose this morning — and ozok. cylinders were withdrawn. The plaster moulded record — looks perfect. Fine glossy surface — and no air holes. Success at last. One of these plaster moulds was injured a little by withdrawing the ozokerite cylinder too soon — and the other is too beautiful to be subjected to risk. I have refrained from trying a print from it — and have placed it in museum as a model. We have made another mould this evening — and will leave it till Monday morning — before attempting to remove ozokerite cylinder. Hope then to try a print from it. Mr. Ellis is making caps for the brass cylinders (tapering) made end of October or beginning of November — so that the ozokerite cylinders cast in them may be moulded into a 3 bottle shape at the ends — I mean shape like bottom of a beer bottle. The flat drum heads with conical hole we now employ — will not fit onto graphophone without paring. This paring by hand generally causes them to fit a little eccentrically — and thus causes wobbling. The moulded ends will give a finish to the ozokerite cylinders — and enable them to fit graphophone perfectly. Think Charlie and your father will recognize that we can make better cylinders than are supplied by graphophone company.

We have also perfected the act of taking plaster moulds of graphophone records. Perhaps our next experiment may show a perfect “print” — I mean an ozokerite cylinder cast from a plaster mould — which will speak perfectly in every part — A perfect reproduction of the original ozokerite record from which the plaster mould was made.

We have not yet been able to obtain this. Our prints would speak well in parts. In one or two cases, I remember the speech was intelligible — over the greater part of the print — but still not to be compared to original. Trouble has largely been — I have no doubt — with the plaster mould. The moulded record was not a perfect copy — on account of pin-hole defects — and partly disintegrated surface. I have worked hard to attain the end — and it would be glorious to reach result before leaving Beinn Bhreagh. Too good to hope for I fear — still plaster moulds we can now make — look so perfect — as to encourage hope of success. Won't expect it however — and then I can't be disappointed 4 however experiment turns out.

Mr. Blanchard took supper with us this evening — and conversation turned upon Electric Lighting and the new disease of the eye — caused by the intermittent Are Light. This led us to Incandescent Lights — and I disputed the assertion that the amount of heat given out by Incandescent Light was inconsiderable. I then launched out on Langley's researcher — showing that we waste — in producing light — an enormous proportion of the total energy involved — in the shape of heat. In the Incandescent Light — the carbon film has to be heated before it gives light — and it yields light because it is heated. It becomes not simply red-hot — but often actually white hot. A great mistake to suppose that Incandescent Lamps do not produce heat. The heat is in a radiant condition and so does not affect air in neighbourhood of lamp — as air is quite transparent to radiant heat.

In producing light — nine-tenths of the energy involved — nay ninety-nine hundredths — is frittered away in heat (of which we make no use) and only an insignificant fraction is utilized as light. This led me to speak of an old idea of mine — that Electricity could be more economically employed in producing heat than light — and that we could easily heat our houses by Electricity. “How?” asked Mr. Blanchard. I replied — “Immerse an incandescent spiral in a non-conducting liquid — like alcohol — glycerine — or oil.”

Oil would be a simple and cheap material. You could have in your room an isolated radiator of any usual sort as is now 5 used for steam heating — or heating by hot water.

Fill your radiator with oil (non-conducting). Now near the bottom of your mass of oil have a spiral of — say — thin iron wire — forming a sort of vertical pipe — Connect this spiral with a suitable electro-motive force (E,M) — a dynamo for example — or storage battery.

If there was no oil the spiral would become red-hot and burn away. But oil in contact with spiral will become heated by contact — and will rise while cooler oil will press its way to spiral.

A circulation of oil will take place — spiral could not become very hot — until it has raised the temperature of the whole mass of the oil. Action is so simple and obvious — that surely other persons must have thought of it before — I have often had it in mind — but somehow — the importance of idea — never struck me so forcibly as tonight.

A radiator or warmer on this principle has not been made to my knowledge — nor do I remember having come across the idea in print. The idea is so simple and obvious — that it seems as if some one else must surely have thought of it.

Certainly a valuable idea. The incandescent spiral produces more heat than light — and it would communicate heat to oil. Oil would communicate it to metal work of radiator — which in turn would warm the air of the room.

As oil can be heated far above temperature of boiling water — no reason to doubt — that cooking could be done — without 6 any fire!

You can make your tea and coffee on the dining room table — without the dangerous alcohol lamp — or the carbonic acid — producing samovar.

Portable warmers or radiators can be made — Electric foot warmers for example supplied. Houses could be warmed without furnaces or fires — and great economy would result. You can heat only one room or all. You can carry a portable heater anywhere you want — Linen closet — bath room — in fact anywhere desired. Electric Lights — are required

chiefly at night — and the Electric Light Plant remains idle most of the day. Electric Light Companys would supply heat by day — and light by night — same plant would serve both purposes. Think there is something important here. Will try experiment here on Monday — with the small dynamo we have — (Gramme machine) — and if as successful as I anticipate — will have search made of Patent Office Gazette to ascertain whether idea is new.

If so — patent should be taken out — as method might be of considerable pecuniary value.

This evening the great event of the week came off — an entertainment in the Warehouse Hall. Astonishing how many people spring up here — at slightest invitation. Not less than 150 people present I think. Great success. I enclose programme written by Mr. McCurdy. And now I think I have written enough for one night. Electric oil heater — a big thing.

Much love to Elsie and Daisy. Telegram from Washington 7 announcing your arrival in Florence. Cabled you this evening that I leave here Tuesday for Washington and sail on the 23rd inst.

Your loving husband, Alec.